

## CONNECTOR ASSEMBLY

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### TECHNICAL FIELD

This invention relates in general to connector assemblies and more particularly to retention features associated with such assemblies.

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### BACKGROUND

Communication products, such as mobile radios, must operate in adverse environments. The automotive environment is one example where products are subjected to extreme variations in temperature and vibration. Connectors that are used in such products usually have a locking mechanism. However, there are several issues with connector locking mechanisms. Plastic retention features on the locking mechanism of the connector tend to deform over time, particularly during hot weather, causing accessories to unplug. While additional retention components such as springs, can be added to facilitate retention, these components increase the manufacturing cost and make assembly more cumbersome.

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Accordingly, there is a need for a connector assembly with improved retention features.

## BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by reference to the following  
5 description, taken in conjunction with the accompanying drawings, in the several figures of which like reference numerals identify like elements, and in which:

FIG. 1 is an assembled view of the connector assembly in accordance with the present invention;

FIG. 2 is a an exploded view of the connector assembly in accordance with the  
10 present invention;

FIG. 3 is an exploded view of the connector assembly in accordance with an alternative embodiment of the invention; and

FIG. 4 is a cross sectional view of the connector assembly in accordance with the present invention.

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## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

While the specification concludes with claims defining the features of the invention that are regarded as novel, it is believed that the invention will be better understood from a consideration of the following description in conjunction with the  
20 drawing figures, in which like reference numerals are carried forward.

In accordance with the present invention there is provided herein a connector assembly having an improved locking and retention mechanism. FIG. 1 is a completed assembly of the connector of the present invention while FIG. 2 is a corresponding exploded view. In accordance with the present invention, connector

assembly 100 includes a cylindrical body 102, at least one locking arm 104 extending therefrom, and an integrally molded malleable collar 106 shaped to provide both resistance and sealing to a receptacle. A strain relief 108 is overmolded to the cylindrical body 102 such that the locking arm 104 is left exposed. The cylindrical  
5 body 102 is preferably formed as a unitary molded portion of substantially rigid material having the ability to deflect, such as a polymer or similar material known in the art. The malleable collar is preferably formed as a second unitary molded portion of silicone or other material having elastic characteristics. The strain relief is formed of material that can deform for overmold purposes known in the art.

10 In accordance with the present invention, cylindrical body 102 has a first end and a second end which will be referred to as the front end 110 and the back end 112 of the connector. Cylindrical body 102 includes contact pins 122 for coupling to a mating receptacle, shown in FIG. 4. The locking arms 104 extend upward from the back end 112 and turn downward alongside the cylindrical body 102 toward front end  
15 110 thus forming a “u” shaped member. The “u” shaped member allows the arm to be compressible though made out of the same substantially rigid material as the cylindrical body 102. The malleable collar 106 slides over the front end 110 of the cylindrical body 102. In accordance with the present invention, the malleable collar 106 includes an integrally molded interior lip 114 for abutting with the front end of  
20 the cylindrical body 102. The lip 114 provides sealing to a mating receptacle 404, shown in FIG. 4.

In accordance with the present invention, the malleable collar 106 further includes at least one integrally molded exterior bump 116 that aligns between the at least one locking arm 104 and cylindrical body 102 to provide resistance to the

locking arm when the locking arm is compressed. For best connectivity, at least one bump 116 should be provided for every locking arm 104. Each locking arm 104 preferably includes a stop tab 124 with a latch 126 integrally molded therein to retain the connector against a housing 402, shown in FIG. 4. If desired, an alignment feature 128 can be molded into front end 110 to provide orientation of the connector assembly 100 into a mating receptacle. Thus, contact pins 122 need not be used for alignment purposes.

FIG. 3 shows an alternative embodiment of the connector assembly in which the cylindrical body 102 is formed of first and second sections 118, 120 as opposed to the single piece shown in FIG. 2. This alternative embodiment allows for multiple connector mating configurations to be achieved by interchanging first section 118 while maintaining section 120 constant. Each configuration of section 118 has its own alignment feature 128 keyed for a predetermined receptacle. Section 118 can be removed or added from section 120 through the use of tabs 130 interconnecting and disconnecting to slots 132.

The locking arms 104 are preferably formed as part of the cylindrical body's back end 112 of second section 120. Each locking arm forms a "u" shaped member that extends upward from the back end 112 and turns downward alongside the cylindrical body 102 when the first and second sections 118, 120 are coupled together. The advantage of the alternative embodiment is that the second section 120 can be used as a base for a variety of interchangeable configurations achieved by substituting in different first sections 118.

FIG. 4 is a cross sectional view of the connector assembly 100 mounted in a communication device housing 402 in accordance with the present invention. The

communication device housing 402, such as a mobile radio housing, is shown with the connector assembly 100 of the present invention plugged into a mating receptacle 404 of the housing. Connector assembly 100 is inserted into the housing 402 by squeezing the locking arms 104 thereby compressing the bumps 116 and then sliding the  
5 assembly 100 into the housing until stopped by the stop tab 124 and latching an edge of the housing with latch 126. The resistance created by the bumps 116 and locking arms 104 ensures that when the connector cable is pulled, the stop tabs 124 do not collapse. Thus, the connection between the locking arms 104 and the housing 402 does not fail.

10 The cross sectional view of FIG. 4 shows how the interior lip 114 of the malleable collar 106 of the present invention abuts with the front end 110 of the cylindrical body 102. In accordance with the present invention, the exterior bumps 116 align in between the locking arms 104 and the cylindrical body 102 to provide resistance to the locking arms when the locking arms are compressed within the  
15 housing. In accordance with the present invention, lip 114 seals about mating receptacle 404. A single contact pin 122 is shown loaded within the cylindrical body 102 and mating to receptacle 404.

Accordingly, there has been provided a connector assembly with improved retention and sealing features. The use of a malleable collar having an interior lip and  
20 exterior bumps along with the compressible locking arms of the cylindrical body provides improved retention and sealing to a receptacle. By forming the cylindrical body of two sections and providing an alignment feature, further advantages can be achieved by the ability to interchange a variety mating configurations.

While the preferred embodiments of the invention have been illustrated and described, it will be clear that the invention is not so limited. Numerous modifications, changes, variations, substitutions and equivalents will occur to those skilled in the art without departing from the spirit and scope of the present invention

5 as defined by the appended claims.

What is claimed is: